SEMESTER END EXAMINATION, MAY, 2024

Course Name: - **B.Tech.** **Semester:-4th**

Paper Name: - **Engineering Mathematics** **Paper Code:- TBS-402**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

समय–3 घण्टे+ 20 मिनटप्रति घंटेअतिरिक्त–दृष्टिबाधित एवंसहलेखकपरीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **3 mark. All questions are compulsory.**
- Section B- Answer any **5 out of 7** given questions in maximum one hundred fifty (150) words. Each question carries **7 marks.**
- SectionC- Answer any **2 out of 3** given questions in maximum three hundred (300) words. Each question carries **10 marks.**

निर्देश:

- प्रश्नपत्र में तीन खण्ड अ, ब, व स हैं।सभी खण्ड अनिवार्य हैं।
- खण्ड–अ में प्रत्येक प्रश्न **तीन अंक** का है।**सभी प्रश्न अनिवार्यहैं।**
- खण्ड–ब में **सात प्रश्नों में से किन्हीं पाँच** प्रश्नों के उत्तर अधिकतम150 शब्दों में दें।प्रत्येक प्रश्न **सात अंक** का है।
- खण्ड–स म**ें तीन प्रश्नो में से किन्ही दो** प्रश्नों के उत्तर अधिकतम (250-300) शब्दों में दें।प्रत्येक प्रश्न **10 अंक** का है।

Section – A (खण्ड–अ)

Objective Questions (वस्तुनिष्ठ प्रश्न)

1. Answer allthe following questions. **5x3 =15**

निम्नलिखित सभी प्रश्न अनिवार्य हैं।

i) Which of the following is true?

a) Differentiability does not imply continuity
b) Differentiability implies continuity
c) Continuity implies differentiability
d) There is no relation between continuity and differentiable

ii) The integral of $\oint \frac{dz}{z^2+4}$ defined on closed curve C where C is the unit circle. Then value of integral is.

a) 0
b) 1
c) 2
d) 3

iii) If X and Y two random variables with respective expected value E(X) and E(Y) then Cov (X,Y) is equal to:

a) E(XY)- E(X/Y)
b) E(XY)-E(X) E(Y)
c) E(X/Y)-E(XY)
d) None of the above

iv) The order of convergence of Newton's Raphson method is

a) 1
b) 3
c) 0
d) 2

v) Numerical integration

integration

a) True
b) False
c) Can't say
d) May or may not

Section – B (खण्ड–ब)

Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum 150 words. **5x7=35**

निम्नलिखितमें से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दो मे दें।

i. a) Consider the functions $f(z) = 4x + y + i(-x + 4y)$,. Discuss df/dz.

b) Prove that the function $f(z) = |z|^2$ is continuous everywhere but not differentiable except origin.

ii. a) Determine whether 1/z is analytic or not?

b) *If ϕ and ψ* are the functions of x and y satisfying Laplace equation show that s+ it is analytic. Where $s = \frac{\partial \phi}{\partial y} - \frac{\partial \psi}{\partial x}$ *and* $t = \frac{\partial \phi}{\partial x} + \frac{\partial \psi}{\partial y}$.

iii. a) *Find analytic function* f(z) . given that $v = e^x(x \sin y + y \cos y)$

b) Evaluate $\oint \frac{e^{-z}}{z^2+1} dz$ over the circular path $|z| = 2$

iv. a) Find the radius of convergence of the power series: $f(z) = \sum_{n=0}^{n=\infty} \frac{n!}{n^n} z^n$

b) Find the residue of a function $f(z) = \frac{z^2}{(z+1)^2(z-2)}$ at its poles

v. a) Write the statement of residue theorem.

b) Discuss about the correlation

vi. a) An urn contains 10 black and 10 white balls. Find the probability of getting two balls of same colour.

b) Find the probability of getting 4 heads in 6 tosses of a fair coin

vii. a) An article manufactured by a company consists of two parts A and B. In the process of manufacture of part A, 9 % are likely to be defective. Similarly 5% are likely to be defective in the manufacture of part B. calculate the probability that assembled article will not be defective.

b) *If the probability of defective bolt is 0.1 find (a) the mean (b) the standard deviation for the* distribution of bolts in a total of 400.

Section - C (खण्ड–स)

Descriptive Questions (विवरणात्मकप्रश्न)

3. Answer any two of the following question in maximum 300 words. **2x10=20**

निम्नलिखितमें से किन्हींदोप्रश्नों के उत्तरअधिकतम300 शब्दोंमेंदें।

i) a) Expand $\frac{1}{z^2-3z+2}$ about (i) $|z|<1$ (ii) $|z|>2$ (iii) $1<|z|<2$.

b) Evaluate the following integral using residue theorem $\oint \frac{4-3z}{z(z-1)(z-2)}dz$ where c is the circle $|z|=\frac{3}{2}$

ii) a) Using Euler's method solve the differential equation in six step: $\frac{dy}{dx}=x+y.y(0)=0$, $h=0.2$

b) Calculate the correlation coefficient between the following data.

x	5	9	13	17	21
y	12	20	25	33	35

iii) a) Find the smallest positive root of the equation $x^3-2x+0.5=0$ using Newton Raphson method.

b) Find the first and second derivative from the following table by Lagrange's method.

x	1	3	-4
y	3	-5	4